

# PRO LOEWE NEWS

The LOEWE research initiatives report



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LOEWE RESEARCH NETWORK IN THIS PRO LOEWE-NEWS,  
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Titelbild: Robot-assisted sensors help to improve data collection and processing in order to comprehensively record changes in biodiversity.  
Photo: Maik Dobbermann

## LOEWE-NATURE 4.0 DEVELOPS AUTOMATED BIODIVERSITY MONITORING TO PROTECT BIODIVERSITY AND ECOSYSTEMS

Insect and forest dieback are current buzzwords that point to the increasing threat to biodiversity, natural and cultivated landscapes and the associated ecosystem services for humans. Despite considerable efforts, the success of previous countermeasures based on manual biodiversity monitoring of individual species is lagging behind the necessary progress. From 2019 to 2022, the **LOEWE research cluster Nature 4.0** therefore developed solutions for automated biodiversity monitoring in order to meet these challenges using networked sensors and artificial intelligence.

An interdisciplinary team of researchers from Philipps-Universität Marburg, Justus-Liebig-Universität Gießen, Technische Universität Darmstadt and the Senckenberg Biodiversity and Climate Research Centre (BIK-F) worked on a sensor network that combined expert observations with data from networked remote sensing and environmental sensors attached to remote-controlled aircrafts, robots, trees and animals.

The sensor network is made up of various components, including audio recording devices to create a „soundscape“ of the forest, non-invasive moth traps to monitor insects, sensor boxes to measure the sap flow and microclimate of trees, innovative telemetry stations for automated and more precise bird and bat detection (<https://trackit.systems>) and sensor boxes for the direct classification of bird calls in the forest. The test area was the „Marburg Open Forest“, which is an important part of research and teaching at the Philipps-Universität Marburg. The sensor network was also used in environmental education projects at schools to promote a broader understanding of ecological relationships.

The team, consisting of experts in geography, computer science, mathematics, ecology and nature conservation, focussed on the development of freely available software and hardware solutions that can be produced using commercially available electronic components. The low-cost, modular sensor components developed enable effective biodiversity monitoring that can be easily adopted by other researchers and nature conservation projects and customised for their specific needs.

The results of the **LOEWE research cluster Nature 4.0** are not only of scientific relevance, but also offer practical findings of great interest to political decision-makers. The pioneering approaches of the project can make a decisive contribution to the protection of biodiversity and ecosystems. In December 2023, the results of the LOEWE Priority Programme were also published in the journal *Global Change Biology* (<https://doi.org/10.1111/gcb.17056>).

Homepage of the project:

<https://www.uni-marburg.de/en/fb19/nature40>

Short video about the project:

[https://youtu.be/u\\_PPubQTDyY?si](https://youtu.be/u_PPubQTDyY?si)



Sensors in the „Marburg Open Forest“, the research and teaching forest of the Philipps-Universität Marburg. Photo: Steffen Böttcher/Hessen schafft Wissen

## LOEWE-emergenCITY CONNECTS WOMEN\* IN SCIENCE

At the **LOEWE Centre emergenCITY**, many research areas are still male-dominated – as is the case elsewhere in science: The LOEWE Centre therefore supports the promotion and networking of women\* in science at all career levels with various targeted offers.

Together with partners at TU Darmstadt, the centre honours outstanding achievements by female students in computer science and electrical engineering every year with the „Female Student Travel Award“. The winners are given the opportunity to take part in an international conference and network.

Another exchange platform is the „Ruzena Bajcsy Lecture on Communications and Resilience“, organised by **emergenCITY** and the SFB MAKI, at which leading female scientists such as Stefanie Roos (TU Delft) and Cecilia Mascolo (University of Cambridge) from the field of communications and resilience research have already spoken in the past few years. Also, the „Networking of Women in Computing, Engineering, and Resilience“ event was launched in this context, giving female students, doctoral candidates and academic staff from various disciplines related to resilience research the opportunity to get to know the Ruzena Bajcsy speaker Eleni Chatzi (ETH Zurich) in advance and exchange ideas in a small group. The next networking event of this kind will take place in June as part of the „**LOEWE-emergenCITY Week 2024**“! Sounds interesting? Are you a student and doctoral candidate? Then sign up for the **LOEWE-emergenCITY Women Networking** mailing list via [office@emergencity.de](mailto:office@emergencity.de) and stay up to date!

Networking in a non-formal setting: The participants of the emergenCITY networking event for women\* at the get-to-know-you breakfast with Prof. Eleni Chatzi from ETH Zurich (second from the top right). Photo: Svenja Andresen



## 100 EUROS SAFE OR 150 EUROS MAYBE?

LOEWE-WhiteBox is also conducting research into why people make the decisions they do

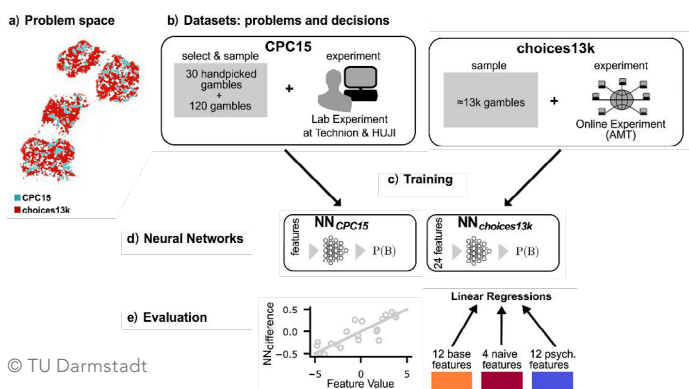
In an article in the international journal "Nature Human Behaviour", researchers from the **LOEWE research cluster "WhiteBox"** at TU Darmstadt have systematically investigated the predictions that result from the combination of machine learning models with experimentally collected data sets of human decisions.\*

Economics, psychology and cognitive science have long been investigating how people make risky decisions, for example between goods or in games of chance. By analysing test series in the laboratory that are similar to betting, attempts are made to find explanations and make predictions. For example, test subjects are given the choice of either receiving 100 euros safely or 150 euros with a 75 per cent probability – i.e. with the risk of a 25 per cent probability of coming away empty-handed. In a recent study conducted at Princeton University in the US, the aim was to create a very precise model of such decisions. To this end, a deep neural network was trained on a new, very large online data set (choices13k) containing more than 13,000 bets.

The result was a neural net that was able to make excellent predictions of human decisions in the choices13k data set. Even better than previous behavioural economic theories, e.g. Prospect Theory, for which Daniel Kahneman received a Nobel Prize in 2002. However, in a further experiment, applied to other, smaller data sets from laboratory studies, the neural network was unable to repeat this performance.

The LOEWE researchers discovered that the interplay between the collection of the test data and the type of prediction models was decisive for this. Respondents in the online choices13k tend to answer randomly at times in order to reduce their workload. This is less often the case with data sets collected in laboratories under supervision. The neural net trained on choices13k is therefore too specifically adapted to the behaviour of the online respondents – a common phenomenon in machine learning known as overfitting.

Conclusion: Neural networks and big data may be able to outperform human theorists' suggestions in terms of predictive accuracy in one data set, but this is no guarantee that this can be transferred to other data sets of human decisions. This requires theoretical expertise, i.e. knowledge of the relationships between human behavioural data and model properties, which must be systematically tested using machine learning.



a) Decision problems in different data sets can be represented in a common description. b) The study uses two data sets: the online data set choices13k and the laboratory data set CPC15. c) Neural networks (NN) were trained on both. d) These networks can be used to predict people's behaviour. However, the networks make different predictions depending on the training data set. e) The differences in the predictions can be explained by existing psychological theories.

\*Article in "Nature Human Behavior", January 2024:  
<https://www.nature.com/articles/s41562-023-01784-6>



Caraway and coriander in mixed cultivation with wheat.

Photo: Prof. Miriam Athmann, LOEWE-TRIO

## LOEWE-TRIO: SUSTAINABLE ARABLE FARMING IN HESSE – ON THE WAY TO CLIMATE-RESILIENT CULTIVATION SYSTEMS

One of the biggest challenges arable farming is facing in Hesse is increasing drought caused by climate change. The changed conditions require a paradigm shift in agriculture in order to secure yields and at the same time counteract soil degradation and the loss of biodiversity. But how can sustainable agriculture be designed that is both ecological and functional? The **LOEWE research cluster "Transformative Mixed Cropping Systems for One Health" (TRIO)**, which has been funded since January of this year, is researching precisely these questions.

The aim is to develop sustainable and climate-resilient cultivation systems through the ecological and functional intensification of arable farming. Together with colleagues from Justus Liebig University Giessen and Hochschule Geisenheim University, scientists at the University of Kassel under the leadership of the Department of Organic Farming and Cropping Systems are researching the integration of deep-rooted medicinal and aromatic plants into agricultural crop rotations in order to make them more resilient to extreme weather conditions caused by climate change.

At four locations in Hesse (Hessian State Domain Frankenhausen near Kassel, Weilburger Grenze near Giessen, Gross-Gerau and Darmstadt), field trials are set up with annual wheat, caraway and coriander as well as perennial wheat, caraway and fennel, both in pure and in mixed stands. Thanks to the cooperation between the three universities and the associated partners Potsdam Institute for Climate Impact Research, Leibniz Centre for Agricultural Landscape Research, Landesbetrieb Landwirtschaft Hessen, Forschungsring e.V. and Ökoplant e.V., **LOEWE-TRIO** has a broad interdisciplinary basis. Four experimental sites supplemented by eight practical sites in Hesse and a dry sandy site in Brandenburg represent the diverse soil-climate areas in Hesse.

In order to investigate the effects of the new cultivation systems, yield and quality of the plants and the underlying mechanisms are analysed on a physiological and (micro-)biological level. Using coupled eco-hydrological and agro-ecosystem modelling, the results are scaled up to the whole of Hesse and climate impacts on the different crops are estimated on a site-specific basis. The expected ecosystem services are valorised through true-cost accounting. Through the collaboration of scientists from a wide range of disciplines and close networking with the associated partners, the results flow directly into agricultural practice and advice. By integrating ecological processes and promoting diversity and resilience, **LOEWE-TRIO** contributes to overcoming the challenges of climate change in agriculture while maintaining the health of soil, plants, animals and humans.



## LOEWE-FCI CO-HOSTS THE FRANKFURT CANCER CONFERENCE 2024: TARGETING THE TUMOR-HOST INTERFACE

The *Frankfurt Cancer Conference* will take place for the third time, this year from August 28 to 30, 2024 at Goethe University's Westend Campus. The international conference is aimed at researchers in translational cancer research, who will be discussing the topic of „*Targeting the tumor-host interface*“. The conference is hosted by the **LOEWE Centre FCI** and the German Consortium for Translational Cancer Research DTKT Frankfurt am Main/Mainz with the University Center for Tumor Diseases UCT.

Numerous renowned experts from Germany, Europe, the USA and Canada have already confirmed their participation as speakers, including Scott Armstrong, Jay Bradner, Alessio Ciulli, Sarah-Maria Fendt, Marco Ruella and Marcel van den Brink. The three-day conference program includes eight interdisciplinary lecture sessions and two poster sessions, covering a wide range of topics: from the tumor microenvironment and tumor metabolism to targeted therapies and molecular drug development. Immune, stromal and vascular cells as well as the microbiome act at the interface between tumor and organism and influence the development of cancer and the course of the disease. Current research findings on molecular mechanisms and signaling pathways as well as the therapeutic significance of this knowledge will be discussed across different tumor entities. „We have put together a diverse conference program and are looking forward to the latest findings on how tumors interact with their host environment and what therapeutic options this opens up. As in previous years, we are expecting over 400 participants and are looking forward to face-to-face discussions with cancer researchers from all over the world,“ says Prof. Dr. Hubert Serve, Chairman of the Organizing Committee.

This year, the *Frankfurt Cancer Conference* will once again take place entirely in person. All scientists working on cancer, students of medicine, biology and biochemistry as well as *medical and clinician scientists* are welcome to submit abstracts on their research projects for a poster presentation by 20 March, from which the *Scientific Organizing Committee* will select the best abstracts for a short presentation. The registration deadline for participation in the conference is June 30, 2024. Please send registrations to:

UNIVERSITY  
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German Consortium  
for Translational Cancer Research  
Targeting Cancer Cancer

DKTK

German Cancer  
Consortium

uct

dkfz

German Cancer Consortium  
Research in Translational Cancer

FRANKFURT  
CANCER  
INSTITUTE

GOETHE  
UNIVERSITÄT  
FRANKFURT AM MAIN

# Frankfurt Cancer Conference

## Targeting the tumor-host interface

August 28-30, 2024



**Registration**  
Registration Deadline June 30, 2024

**Location**  
Goethe University Frankfurt, Campus Westend, Casino,  
Theodor-W.-Adorno-Platz 1, 60323 Frankfurt am Main

**More Information**  
[www.frankfurtcancerconference.org](http://www.frankfurtcancerconference.org)



**Abstract  
Deadline  
March 20,  
2024**



### Frankfurt Cancer Conference 2024

Targeting the tumor-host interface

August 28 –30, 2024

Campus Westend, Casino, Festsaal

Abstract Deadline: March 20, 2024

Registration Deadline: Jun 30, 2024

Attendance fee: 438 Euro

Information regarding program, abstract submission and registration: [www.frankfurtcancerconference.org](http://www.frankfurtcancerconference.org)

## „Microbes 4 Climate“ From Greenhouse Gases to Products

22. Mai 2024  
Zentrum für Synthetische Mikrobiologie  
Philipps-Universität Marburg

[www.uni-marburg.de/synmikro](http://www.uni-marburg.de/synmikro)







## 11<sup>th</sup> SYMPOSIUM OF THE FORMER LOEWE CENTRE SYNMIKRO

The „Microbes4Climate Meeting, hosted by Synmikro (former LOEWE) and MPI-TM Marburg, will explore the pivotal role of microbes in driving and mitigating climate change. We also organized a public talk, given by Jacob Beautemps (breakinglab), a well known YouTuber.

### LEGAL NOTICE

**ProLOEWE.** LOEWE Research Initiatives Network

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Cuban painted snail  
(*Polymita picta*)

Photo: Bernardo Reyes-Tur



Chilean Abalone  
(*Concholepas concholepas*)

Photo: Gustavo Duarte Sepulveda



Greater Argonaut  
(*Argonauta argo*)

Photo: Marco Gargulio

## LOEWE CENTRE TBG, SENCKENBERG AND UNITAS MALACOLOGICA CALL FOR THE ELECTION OF THE INTERNATIONAL MOLLUSC OF THE YEAR 2024!

**Vote for the "International Mollusc of the Year 2024"! In addition to publicity, the winning species will have its genetic information completely decoded at the LOEWE Centre TBG.**

**In 2024, five mollusc species will again be up for election as the "International Mollusc of the Year"! Anyone interested can take part in the online public vote from 13 March to 14 April 2024.** The competition was launched in 2020 by the Senckenberg Society for Nature Research, the **LOEWE Centre for Translational Biodiversity Genomics (TBG)** and Unitas Malacologica, the world mollusc society, to raise awareness of the diverse and species-rich group of molluscs and to sensitise the public to their conservation. The winning species will have its entire genetic information sequenced at the **LOEWE Centre TBG**.

The previous winners: in 2021 it was the octopus species Greater Argonaut (*Argonauta argo*) from the Mediterranean, in 2022 the colourful endangered Cuban painted snail (*Polymita picta*) and in 2023 the Chilean Abalone (*Concholepas concholepas*).

Take part in the online vote for the "International Mollusc of the Year 2024" from 13 March to 14 April 2024:

<https://www.senckenberg.de/en/molluscoftheyear2024>

Information:

<https://tbg.senckenberg.de/mollusc-of-the-year/>





Professor Dr Sandra Ciesek is Director of the Institute of Medical Virology at the University Hospital Frankfurt am Main and Professor of the same subject at Goethe University. She is also a co-spokesperson for LOEWE-CoroPan and was awarded a LOEWE Top Professorship at Goethe University Frankfurt for five years in 2021 funded by the state of Hesse.  
Photo: Katrin Binner

## Professor Dr Sandra Ciesek Esteemed Corona Expert

Prof Ciesek, in addition to your work as a virologist, you also act as co-spokesperson for the LOEWE research cluster CoroPan, which has been funded since January of last year. What do you aim to achieve with the project?  
*As part of CoroPan, we are working on various coronaviruses, not just SARS-CoV-2. From a virological point of view, coronaviruses are a virus family with high potential to trigger further pandemics in the future. After SARS 2002/2003 and MERS, COVID-19 was already the third pandemic triggered by a coronavirus – albeit on a different scale. One goal of CoroPan is therefore to better understand the coronavirus family and, for example, to research specific similarities between these viruses in order to find therapeutic targets that are as effective as possible against many or, in the best case, all coronaviruses. After all, there are hundreds of other coronaviruses in the animal kingdom that could jump over to us humans. With this project, we would therefore like to contribute to a better understanding of this virus family and prepare specifically for possible further pandemics triggered by coronaviruses.*

During the corona pandemic, you became one of the leading experts on SARS-Cov-2 and were honoured with the Federal Cross of Merit First Class for „your pioneering scientific commitment in the context of the corona pandemic“. What was that like for you? *First of all, it's a great honour to have my personal and scientific achievements recognised in this way. It's also great that so many people obviously campaigned for me to receive this award.*

*It shows that although you have invested a lot privately and professionally, these activities are appreciated by the public. On the other hand, you immediately think about the negative impact the honour could have. In addition to congratulations, my colleagues and I still receive hostility in response to such announcements. It's a shame that this tarnishes the joy.*

Looking back on the coronavirus pandemic, is there anything you would do differently today or with regard to future pandemics? *To begin with, this pandemic with a previously unknown pathogen was a major challenge for virology and it is very positive to mention that the knowledge gained about this pathogen was enormous, especially at the beginning. Germany was able to make decisive contributions to the development of tests and vaccines. Of course, there were also things that we could have done better, but in hindsight you always have to consider the state of knowledge at the time. In my field of virology, we should have invested more in basic research of pandemic pathogens after the SARS pandemic in 2002/2003 and in the development of antiviral substances. We virologists are very good at assessing which viruses have pandemic potential. And we know that there will be more pandemics in the future. But my overall impression is that Germany is not such a leader in disease prevention. It also costs a lot of money without knowing exactly when and whether we will need an antiviral substance or certain data on a pathogen and its spread. The LOEWE funding for CoroPan is a positive signal here.*

What do you think makes LOEWE research funding so valuable? *I think LOEWE research funding makes Hessen particularly attractive for scientists. On the one hand, there are the LOEWE top professorships, so that Goethe University, for example, recently appointed Prof Mathias Munschauer, an extremely talented scientist and ERC grant winner from Würzburg, to a W2 professorship at my institute. I am sure that this would not have been possible without the support of LOEWE research funding. On the other hand, the LOEWE Centres and Clusters such as CoroPan help the Hessian universities to network better and thus have better chances of jointly applying to the DFG for collaborative research projects. The multi-year funding within the framework of a LOEWE Cluster prepares us scientists optimally for such collaborative research proposals, because we not only generate joint preliminary work, but can also grow together as colleagues.*

The entire interview is available online at [proloewe.de](https://proloewe.de)